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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/961,291	09/25/2001	Takeyuki Itabashi	501.37226VX1	6791

20457 7590 12/17/2004

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EXAMINER

ORTIZ, EDGARDO

ART UNIT

PAPER NUMBER

2815

DATE MAILED: 12/17/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/961,291

Applicant(s)

ITABASHI ET AL.

Examiner

Edgardo Ortiz

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 September 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) 8-20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Applicant's election with traverse of species IV, and the argument that claim 1 is generic to all species, in the reply filed on September 22, 2004 is acknowledged.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-6 are rejected under 35 U.S.C. 102(b) as being anticipated by Krishnan et al. (U.S. Patent No. 5,451,551). With regard to Claim 1, Krishnan discloses a semiconductor device comprising an insulator layer (16) having at least one of a via-hole (22) for forming a via-stud and a trench (22) for forming a wire, wherein said one (34) of the via-stud and the wire is formed directly on inner surfaces of said one of the via-hole and the trench (column 3, lines 42-51), through a barrier layer (24) which is made of a high-melting point metal (Titanium-Tungsten), and wherein said one of the via-stud and the wire is formed of said metal (column 3, lines 35-38; column 4, lines 20-32 and figure 7).

With regard to Claim 2, Krishnan discloses a semiconductor device comprising insulator layers (16) having a via-stud and insulator layers having a wire, said insulator layers having said via-stud and said insulator layers having said wire being alternately formed (figure 2), wherein said

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via-stud and said wire are respectively formed in a via-hole (22) and a trench (22) directly on inner surfaces of said one of the via-hole and the trench (column 3, lines 42-51), respectively, through a barrier layer (24) which is made of a high-melting point metal (Titanium-Tungsten), and wherein said one of the via-stud and the wire is formed of said metal (column 3, lines 35-38; column 4, lines 20-32 and figure 7).

With regard to Claim 3, Krishnan discloses a semiconductor device comprising an insulator layer (16) having at least one of a via-hole (20) for forming a via-stud and a trench (22) for forming a wire, wherein said one of a via-stud and the wire is formed directly on inner surfaces of said one of the via-hole and the trench, through a barrier layer (24) which is made of a high-melting point metal (Titanium-Tungsten), and wherein said one of the via-stud and the wire is formed of said metal (column 3, lines 35-38; column 4, lines 20-32 and figure 7). It is noted that the limitation *“through electroplating after electro-less plating of said metal”* is a product-by-process limitation. The presence of process limitations on product claims, which product does not otherwise patentably distinguish over prior art, cannot impart patentability to the product. In re Stephens 145 USPQ 656 (CCPA 1965).

With regard to Claim 4, Krishnan discloses a semiconductor device comprising an insulator layer (16) having at least one of a via-hole (20) for forming a via-stud and a trench (22) for forming a wire, wherein said one of a via-stud and the wire is formed directly on inner surfaces of said one of the via-hole and the trench, through a barrier layer (24) which is made of a high-melting point metal (Titanium-Tungsten), and wherein said one of the via-stud and the wire is formed of said

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metal (column 3, lines 35-38; column 4, lines 20-32 and figure 7). It is noted that the limitation “*wherein the whole of said one of via-stud and the wire is formed through electro-less plating*” is a product-by-process limitation. The presence of process limitations on product claims, which product does not otherwise patentably distinguish over prior art, cannot impart patentability to the product. In re Stephens 145 USPQ 656 (CCPA 1965).

With regard to Claim 5, Krishnan discloses a semiconductor device comprising insulator layers (16) having a via-stud and insulator layers having a wire, said insulator layers having said via-stud and said insulator layers having said wire being alternately formed (figure 2), wherein said via-stud and said wire are respectively formed in a via-hole (22) and a trench (22) directly on inner surfaces of said one of the via-hole and the trench (column 3, lines 42-51), respectively, through a barrier layer (24) which is made of a high-melting point metal (Titanium-Tungsten), and wherein said one of the via-stud and the wire is formed of said metal (column 3, lines 35-38; column 4, lines 20-32 and figure 7). It is noted that the limitation “*wherein an entirety of said via-stud and an entirety said wire formed through electro-less plating*” is a product-by-process limitation. The presence of process limitations on product claims, which product does not otherwise patentably distinguish over prior art, cannot impart patentability to the product. In re Stephens 145 USPQ 656 (CCPA 1965).

With regard to Claim 6, Krishnan discloses a semiconductor device comprising an insulator layer (16) having at least one of a via-hole (20) for forming a via-stud and a trench (22) for forming a wire, wherein said one of a via-stud and the wire is formed directly on inner surfaces of said one

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of the via-hole and the trench, through a barrier layer (24) which is made of a high-melting point metal (Titanium-Tungsten), and wherein said one of the via-stud and the wire is formed of said metal (column 3, lines 35-38; column 4, lines 20-32 and figure 7). It is noted that the limitation “*wherein an entirety of said via-stud and an entirety said wire are formed through electro-less plating*” is a product-by-process limitation. The presence of process limitations on product claims, which product does not otherwise patentably distinguish over prior art, cannot impart patentability to the product. In re Stephens 145 USPQ 656 (CCPA 1965).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Krishnan et al. (U.S. Patent No. 5,451,551). With regard to Claim 7, Krishnan essentially discloses the claimed invention but fails to disclose, the claimed diameter of the via-stud smaller than 0.3 μm .

However, it would have been obvious to someone with ordinary skill in the art at the time of the invention, to modify the structure as disclosed by Krishnan to include the claimed diameter of the via-stud smaller than 0.3 μm , since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. In re Aller, 105 USPQ 233. In the instant case, such a modification in the

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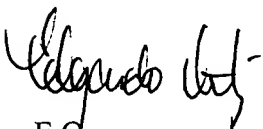
Krishnan structure would result in an optimization in the overall size of the final structure and reduction in process time and use of materials.

Conclusion

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Edgardo Ortiz whose telephone number is 571-272-1735. The examiner can normally be reached on Monday-Friday (1st Friday Off).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on 571-272-1664. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



E.O.

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